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CAULIFLOWER VARIETY SNOWBALL GROWN AT THE FARM

RESEARCH HIGHLIGHTS 1957-58

WHITEHORSE EXPERIMENTAL
FARM

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RESEARCH HIGHLIGHTS 1957-58

WHITEHORSE EXPERIMENTAL
FARM

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INTRODUCTION

The Whitehorse Experimental Farm is located at Mile 1019, Alaska Highway, Yukon Territory. Geographically it is situated at approximately North Latitude $60^{\circ} 45'$, West Longitude $137^{\circ} 35'$. It has a total area of 1180 acres of which 200 acres are cleared and tillable.

This agricultural research unit is operated by the Canada, Department of Agriculture to study the problems of agricultural production in the Yukon Territory. The chief obstacles encountered are soil infertility, a short frost-free season and lack of rainfall.

While it has been known since the time of the Klondike gold rush in 1898 that many of the hardier agricultural crops would grow at this northern latitude, very little factual information was available until the establishment of this Farm in 1944. The Progress Report for 1945-1952 should be consulted for information obtained up to 1952. Shortly, another Progress Report will be available covering a further 5 year period.

The work of the Whitehorse Farm is dedicated to a study of these crops in terms of the modifications to the southern agricultural practices that are necessary to achieve maximum crop production in the north as well as to the introduction, testing and breeding of new crops which might become adapted to northern conditions.

Small herds of beef cattle and swine and a flock of laying hens are also maintained at the Farm. These livestock are used for studies concerning the feeding, management and cold tolerance of farm animals and birds raised in a sub-Arctic climate.

This leaflet briefly reviews the accomplishments and research results obtained during 1957-58, together with a list of recommended varieties for this region.

WEATHER

The winter of 1956-57 was average in severity with a snowfall of 65.7 inches which exceeded the long term average by 20.6 inches; the temperature fell to a low of -50.5°F . The winter of 1957-58 was milder and more temperate with a lighter than average snowfall of 36.8". The lowest temperature of the season reached -39.5°F .

The summer of 1957 was considerably warmer than the average of the past 13 years. From May to September the total of the mean monthly temperatures averaged 20.4°F . higher than that of 1956 and 19.5°F . higher than the 13 year average for the same period. The killing frost free period (temperatures above 28°F .) was 81 days in 1957 as compared with 41 days in 1956. Dry weather prevailed from early spring to mid-July, causing retarded plant growth. However the precipitation of late July and early August together with the above average temperatures of late August stimulated the growth of the retarded plants to complete maturity. The autumn season was long and very pleasant. All crops matured and harvesting and ploughing were easily completed before freeze-up. Generally the growing season of 1957 was nearly optimum for our region.

The summer of 1958 was somewhat warmer than the average of the past 14 years, with the mean monthly temperatures for May to September exceeding the long term average by 10°F . The warmest temperature on record at Mile 1019 was the 86°F . of June 6, 1958. The killing frost free period of 79 days was 26 days longer than the long term average growing season of 53 days. The summer rainfall of 3.7 inches was 1.3 inches less than the average. As well 2.4 inches of the season's total rain did not fall until August. This caused a moisture deficiency which in combination with the warm temperatures of June and July resulted in poor plant growth. Generally the 1958 season was considered to be too dry for maximum crop production.

METEOROLOGICAL DATA RECORDED AT EXPERIMENTAL FARM
Mile 1019 Whitehorse, Y.T. 1958

Lat. N. 60° 45'

Long. W. 137° 35'

	1958 Max Temp.	1958 Min. Temp.	1958 Max Temp.	1958 Mean Temp.	1958 Mean Temp.	1958 Ave. Mean Temp.	1958 Rain	Ave. Rain	1958 Snow	Ave. Snow	1958 Total Precip- itation	1958 Bright Sunshine Hours	Ave. 13 yrs. Sunshine Hours	Free Surface Evaporation inches	
January	44.5	-35.0	12.3	-8.7	1.8	-6.30	0	.01	15.8	7.07	1.58	.72	18.3	20.22	"
February	40.0	-29.0	14.4	-10.5	1.9	-.51	0	.002	2.7	4.09	.27	.41	69.6	76.16	"
March	46.0	-25.0	30.6	-4.5	13.0	14.15	0	.02	2.7	2.59	.27	.28	215.4	156.17	"
April	66.9	9.0	48.8	21.5	35.2	28.22	.7	.19	.1	2.03	.71	.39	274.9	195.42	"
May	79.0	19.0	58.0	29.5	43.7	41.05	.02	.38	0	.86	.02	.47	288.0	260.92	4.13
June	86.0	29.0	70.8	38.5	54.7	49.50	.66	1.15	0	.17	.66	1.17	328.4	257.54	5.32
July	81.5	33.0	70.4	41.7	56.0	52.93	.15	1.44	0	0	.15	1.44	293.4	246.83	5.34
August	73.0	25.0	62.1	37.0	49.5	49.43	2.40	1.06	0	0	2.40	1.06	209.3	217.16	3.26
September	64.0	15.0	54.6	26.7	40.1	41.11	.49	.99	0	2.04	.49	1.19	161.2	148.42	.53
October	65.0	-23.0	34.8	10.1	22.5	27.82	.03	.82	8.8	7.74	.91	1.59	111.6	84.49	"
November	43.0	-27.0	20.2	10.0	15.1	10.65	0	.51	10.2	9.44	1.02	1.45	25.4	20.70	"
December	39.0	-41.0	6.0	-12.3	-6.3	5.30	0	.35	15.3	9.86	1.53	1.34	2.1	3.07	"
Total							4.45	6.922	55.6	45.89	10.01	11.51	1997.6	1697.50	18.58

Date of last spring frost, June 30th. - 30°F.

Date of last spring registration of killing frost, May 29th. - 28°F.

Frost Free Period - 33 days.

Killing frost is 28°F. and lower.

Killing frost free period - 14 year average - 53 days.

Sun obscured by mountains from December 3rd., 1958 to January 11th., 1959.

Date of first fall frost, August 2nd. - 32°F.

Date of first fall killing frost, Aug. 16th. 28°F.

Killing frost free period, 1958, 79 days.

ANIMAL AND POULTRY SCIENCE

Beef Cattle

A small herd of purebred Shorthorn cattle is maintained at the Farm for observing the cold tolerance and adaptability of beef cattle to Yukon farming conditions.

The health status of the herd is very good. All animals were negative in their reaction to the tests for tuberculosis and brucellosis in September, 1958. The calf crop has been 100 per cent each year since 1955.

In winter the cattle are allowed access to small sheltered pens for protection from the weather. The object of housing is to keep the animals dry and free from draughts. They are fed outside and watered at a nearby creek.

The herd has been wintered satisfactorily on a feed allotment of 3 green oat bundles each per day for adult animals and 1.5 bundles for yearlings. A hay ration of 20 pounds per day for mature cattle and 10 pounds of hay plus 3 pounds of oat and barley chop for yearlings has been equally as good. Brood cows are fed 5 pounds of oat and barley chop per day from March 15 (one month before calving) until the herd goes to pasture about June 1. The cattle are allowed free access to minerals and salt at all times.

In 1958, the eight calves born were weaned on October 14, at an average age of 155 days. Their average weight was 341 pounds and the average daily gain was 1.72 pounds.

Swine

In July 1957, a small swine herd of two sows and a boar was added to the livestock at the Farm for observing their adaptability to Yukon farming conditions.

In early 1957 the sows were bred. They farrowed litters of 9 and 11 pigs respectively. Four of the piglets were sold as weaners, two gilts were retained for breeding and the remaining 14 hogs were sold at an average age of 185 days and an average weight of 218 pounds. When compared with grade A and B carcasses purchased in Edmonton by a local wholesale company, the Farm-raised hog carcasses were quite acceptable in conformation and quality.

The swine herd is self-fed a ration composed of 40 per cent protein supplement mixed with home grown coarse grains. In winter the average daily feed consumption is 9 pounds per sow. The sows are housed in an ordinary swine barn without supplementary heat. They appear to tolerate the severe weather quite well.

Poultry

A flock of about 100 laying hens is maintained on a yearly basis at the Farm for observing the adaptability of poultry to sub-Arctic conditions.

One hundred White Leghorn pullets, which had been hatched in Edmonton in mid-May and raised at the Farm, were placed in the laying house in October 1957. By December this flock had an egg production in excess of 70 per cent.

In 1958, 120 Leghorn hybrid pullets, hatched in Edmonton and raised at the Farm were housed in October when they started to lay at 21 weeks of age. This flock had an egg production of 80 per cent for the month of December 1958.

To economize on feed costs, a supply of 40 per cent protein supplement was purchased from Vancouver in 1957 instead of a complete poultry feed. This supplement when properly mixed with homegrown coarse grains made very satisfactory starter, grower and laying mash at a rea-

sonable cost. The average daily winter feed requirements for a laying hen were found to be 0.2 pounds of laying mash and 0.09 pounds of scratch grain.

During prolonged periods of very cold weather a group of four 250 watt heat lamps were used to maintain temperatures in the laying house at above freezing.

CEREAL CROPS

Generally oats and barley can be successfully grown at the Farm. Sometimes the freshly threshed grain contains too much moisture to be stored immediately thus requiring some special care in drying. It is not difficult however to consistently raise oats and barley of good feed grade quality.

Cereal plant diseases have not been a problem in the Yukon as yet. Trace amounts of rust and smut have been found however.

Oats

The variety Abegweit has consistently proved superior to the other oat varieties tested at this Farm. It is early maturing, and produces a high yield of good quality grain; yields of 75 bushels per acre are not uncommon. Other varieties tested were Ajax, Beaver, Exeter, Fundy, Garry, Gold Rain, Larain, Rodney, Scotian, Shefford Shield, Vicland and Victory. These varieties are not recommended because they mature late and yields are poor. The new variety Little shows promise as a high producer, but insufficient results are available on which to base a recommendation.

Barley

Olli is still the recommended barley variety for the Yukon because of its early maturity, good quality and consistently high yield. It normally matures in about 77

days and produces 36 bushels or more per acre of good quality grain. The varieties, Asa, Edda, Gateway, Husky, Parkland, Pirkka, Vantage, Vantmore and Wolfe have also been tested. Asa is second only to Olli and this variety may prove superior in future tests. The other varieties listed are too late in maturity or too low in production to be suitable for the Yukon.

Spring Wheat

In general spring wheat is not considered a reliable grain crop for the Yukon. Its late maturity often results in the production of green immature grain which is difficult to store. However, wheat of an acceptable feed grade is usually produced and can be used satisfactorily in home grown mixed feeds for livestock.

Saunders has proved to be the best of the six spring wheat varieties tested. Its chief advantages lie in early maturity and resistance to frost damage. In a normal season yields of about 30 bushels per acre of plump, heavy grain can be expected from the variety Saunders. Generally Thatcher is second only to Saunders in suitability, but the other varieties are too late maturing for good production in the Yukon. The varieties, Bell, Gasser, Khogot, Thatcher and Yagui 50 have also been tested.

Winter Wheat

Winter wheat reaches a more advanced stage of maturity than spring wheat before it is subjected to fall frosts but it seldom is ripe and dry enough to be stored in the bin when newly threshed. Yields of winter wheat do not exceed those of spring wheat but, for any given year, winter wheat usually produces grain superior in quality to spring wheat.

The recommended winter wheat is Kharkov MC22. This variety has proved superior to Comanche, Marmin, Minhardi, Minter, Minturki and Yogo, chiefly on the basis

of its winter hardiness and higher average yield which was 26 bushels per acre.

Winter Rye

The varieties Dakold and Sitnikoff have been tested. Because of its superior winter hardiness Sitnikoff is the recommended variety for the Yukon. It has averaged 35 bushels per acre.

FIELD HUSBANDRY

Crop Rotations

A 6-year crop rotation of grain, grain, hay seeded without a nurse crop, hay, hay and hay has proven to be the best of four rotations studied at the Farm. The other rotations were, (a) a 2-year rotation of grain and fallow, (b) a 3-year rotation of grain, grain and fallow, and (c) a continuous grain crop. No fertilizer was used.

The average grain yield (Ajax oats) in the 6-year rotation exceeded 42 bushels, the 2-year rotation averaged 28 bushels, the 3-year rotation 26 bushels and the continuous grain cropping reached 21 bushels per acre. The hay stands were 40 per cent legumes and 60 per cent grasses. The average hay tonnage per acre declined from 0.8 for first year crops to 0.6 tons for third year stands. This decline was caused primarily by a decrease in the stands of legumes after the first year.

The Response of Barley to Commercial Fertilizers

To hasten maturity and increase the yield of barley, it is recommended that 100 pounds per acre of ammonium phosphate (11-48-0) fertilizer be applied at the time of seeding. This fertilizer was compared with ammonium nitrate, triple super-phosphate, muriate of potash, ammonium phosphate and a complete (9-27-9) fertilizer for their effects on barley production.

After early spring frost damage, plants which had received the phosphorus fertilizers recovered rapidly; those not treated with phosphorus made a very slow recovery. This had a great effect on the rate of maturity of the barley plants. Stimulus to recovery from frost damage together with a general acceleration of plant maturity resulting from the phosphorus treatments caused this barley to mature 7 days earlier than normal. The hastening of maturity is a very important factor in the production of mature grain at this location because of the short growing season that prevails.

Phosphorus fertilizers, in addition to hastening maturity, also favored yield increases, although partly as a result of the rapid recovery made by the seedlings from frost damage, which thus enabled the plants to tiller-out more. As well the phosphatic fertilizers increased the amount of phosphorus available to the growing plants for a soil test shows a phosphorus deficiency in our soils. These stronger, more advanced barley plants produced a larger number of heavy mature heads and so increased the grain yield.

The application of muriate of potash and ammonium nitrate tended to depress the yield and delay the maturity of the grain.

Barnyard Manure and Commercial Fertilizers for Oats

Barnyard manure and commercial fertilizer treatments applied to oat plots have resulted in marked increases in oat yields. The application of manure gave a greater increase in yield than did any of the four commercial fertilizers used. The treatments used and the average yields obtained from experimental plots were as follows:

Manure (10 tons per acre)	— 91	bushels per acre
11-48-0 (50 lb. per acre)	— 76.5	" " "
11-48-0 (100 lb. per acre)	— 74.2	" " "
11-48-0 (50 lb. per acre)	— 70.3	" " "

0-0-60 (33 lb. per acre)	—	70.3	bushels per acre
16-20-0 (50 lb. per acre)	—	60.3	" "
Check (no fertilizer)	—	64.2	" "

In addition the residual effect of the manure treatment the second year after application was significantly greater than that of any other treatment. The addition of manure to the soil increased the soil moisture-holding capacity and the level of plant nutrients available to the oats.

The Effects of Commercial Fertilizers on Pastures

The application of ammonium nitrate (33-0-0) fertilizer at the rate of 250 pounds per acre to an established pasture mixture of brome grass, creeping red fescue, western wheatgrass, crested wheatgrass and alfalfa gave the most economical response of six fertilizer treatments tested.

Other treatments were:

- a. ammonium phosphate (11-48-0) at 200 lb. per acre
- b. ammonium phosphate (16-20-0) at 500 lb. per acre
- c. superphosphate (0-20-0) at 500 lb. per acre
- d. muriate of potash (0-0-60) at 130 lb. per acre
- e. complete fertilizer (10-20-10) at 500 lb. per acre

The 16-20-0 treatment gave the greatest response with an average green forage yield of 3.4 tons per acre compared with a response from ammonium nitrate of 2.7 tons. In a consideration of the residual effects of the fertilizer treatments the second year after application the average yield of the 16-20-0 treatment exceeded the 2.6 ton yield of ammonium nitrate by 0.4 tons. However the increased cost of the 500 pounds of 16-20-0 compared with the cost of 250 pounds of ammonium nitrate was not offset by the value of the 1.1 ton yield advantage of the 16-20-0 treatment.

The yield increases resulting from the application of the other fertilizer treatments were not comparable with

those of the 16-20-0 or the ammonium nitrate treatments. In fact the superphosphate and potash treatments appeared to have a depressing effect on the yields under these conditions.

Farm Tractor Operating Costs

In 1953 a farm tractor of 35 drawbar horsepower was purchased for \$2540.00. Last year this machine when operated for 1112 hours required \$15.50 worth of repair parts, 15.5 hours of maintenance labour, 1223 gallons of gasoline and 102 quarts of oil. The cumulative work time and costs of operating this machine are 4139 hours of work, \$90.32 for repairs and 92 hours of maintenance labor. The average cost of operation for a 10-hour day in 1958 was \$4.61 inclusive of depreciation, interest, housing, etc.

In 1956 a small four wheeled garden tractor of 15 horsepower was purchased for \$1050.00. Last year this machine when operated for 540 hours, required \$19.20 worth of repairs, 28 hours of maintenance labour, 173 gallons of gasoline and 27 quarts of oil. The cumulative work time and costs of operation are 929 hours of work, \$79.14 for repairs and 53.5 hours of maintenance labour. The average cost of operation for a 10-hour day in 1958 was \$2.90.

The cost of gasoline is 34 cents per gallon, oil is \$2.00 per gallon and maintenance labour is \$2.35 per hour.

FORAGE CROPS

The forage crops investigations are conducted to select the species and varieties of grasses and legumes that are most adaptable for hay and pasture in the Yukon.

The most promising species of the forage grasses studied, are brome grass, wheat grasses, wild rye grasses, fescues and reed canary grass.

Brome Grass

This is the hardiest grass tested at Mile 1019. It

is easy to establish, withstands considerable drought and maintains its stands well. It is recommended for upland hay and pasture crops, and in a pasture mixture it may be used as the main species. The variety "Manchar" or "Canadian Commercial" grade of seed are well suited to Yukon growing conditions. The varieties "Mandan 404" and "Parkland" are inferior in production to the first two named.

Wheat Grass

Crested wheatgrass starts early in the spring making it a very suitable grass for use in early pasture mixtures.

Slender and Intermediate wheat grasses are very winter hardy. They are best suited for use on poor sandy soil where they will provide some light grazing and will prevent soil erosion.

Wild Rye Grass

Siberian wild rye grass produces early spring herbage of good quality. It is quite winter hardy and seed can be produced locally without difficulty. The loss in palatability after heading is a disadvantage of this species.

Russian wild rye grass produces an abundance of basal leaves and produces good spring pasture. However the herbage becomes quite coarse in texture during mid-summer.

Canada wild rye grass is very slow in producing spring growth. However it does make rapid lush growth during the summer months when many other forage species are in a period of partial dormancy.

Fescue

Creeping red fescue produces good plant growth on low land. It should be used only as minor component of a pasture mixture.

Tall fescue is very winter hardy and does well in a pasture mixture.

Reed Canary Grass

This species can be satisfactorily grown with timothy on low land with an adequate supply of moisture. If the spring conditions are such that flooding occurs for a prolonged period timothy may be partly flooded out, but reed canary grass thrives under these conditions.

Other Grasses

Timothy is best suited as a low land hay crop. When used as such it will produce hay of good quantity and quality.

Big blue grass is equal in winter hardiness to tall fescue and can be used as a minor part of the pasture mixture.

Legumes

At present the adaptation of domestic legume crops at this location is extremely limited because of "Brown Root Rot", a disease which is prevalent under the cool climatic conditions of the Yukon. "Brown Root Rot" is caused by a parasitic fungus that thrives in cool soil. It attacks the tap roots of legume plants 4 to 5 inches below the ground level and infected plants are soon weakened and killed. This organism was first noted at the Farm in 1952. Since that time it has been found elsewhere in the area and it is now believed to be quite common to the whole Territory.

Stands of common alfalfa in the introductory nursery have shown a 99 per cent loss the second year after planting, from the effects of "Brown Root Rot". Sweet clover is similarly very susceptible to the disease. Red clover and alsike clover are moderately susceptible; yellow blossom alfalfa (*Medicago falcata*) shows quite marked resistance and hence is recommended as the most suitable species of domestic field legume for the Yukon.

HORTICULTURE

Vegetables

Successful vegetable gardening in the Yukon depends chiefly upon the selection and use of varieties that are adaptable to the location. Most common garden vegetables can be grown by one of the following cultural methods, (a) garden sown, (b) greenhouse sown in beds or flats and later transplanted to the garden, (c) greenhouse sown in beds or flats and later transplanted to cold frames and (d) greenhouse sown in beds for retention in ~~the~~ greenhouse.

Many vegetable varieties have been tested for their performance and adaptability at the Farm. Those best suited to Yukon growing conditions are briefly described.

(a) Garden sown crops

BEANS

Broad beans are fairly hardy and produce well in this area. Windsor is the recommended variety. Many varieties of bush beans have been tested but they are not recommended here because of their susceptibility to frost damage.

BEETS

The two best varieties tested are Detroit Dark Red and Flat Egyptian. Detroit Dark Red has a round root, good flesh color, and good keeping qualities. Flat Egyptian is a good early maturing type with a flat root. It tends to deteriorate in quality when allowed to over mature.

CARROTS

Amsterdam and Golden Hart are the best early maturing varieties. They produce good quality roots.

Red Cored Chantenay is the best mid-season variety. It produces a small to medium cored root with good storing qualities.

LEAF LETTUCE

Salad Bowl is a very good early maturing producer of wavy, fine textured leaves. It is slow to bolt.

Grand Rapids is the best medium maturing variety. It has wavy curled leaves which tend to form a compact heart similar to head lettuce.

ONIONS

Restricted to onion sets.

White — early maturing type.

Yellow — medium maturing type.

Red — late maturing type.

PARSNIPS

Short Thick is the best early maturing variety. It produces broad shouldered, clean, white roots of fine texture.

Hollow Crown is a fair producer of clean, white, hollow crowned roots of good quality.

PEAS

Alaska is the earliest variety but the quality of these peas is average to low.

Little Marvel is a little later in maturity and produces good quality peas.

Laxton's Progress is a still later maturing variety that produces good quality peas.

POTATOES

Of the 16 varieties tested, Warba has proved to be the most satisfactory chiefly because of its earliness. This variety is quite susceptible to scab however. Known varieties that are scab resistant generally do not produce tubers of marketable size in the short season that prevails at the Farm. Continual testing is being carried on to find a potato variety that possesses the proper combination of earliness and scab resistance.

RADISHES

Cherry Belle and Comet are the best of the radish varieties tested. Comet is slower to bolt.

RUTABAGAS

Laurentian produces the best quality, smooth, purple topped, yellow fleshed roots.

SPINACH

America, King of Denmark and Bloomsdale are all recommended varieties that produce dark green, curled crisp leaves of good quality.

Bloomsdale is slow in bolting.

SWISS CHARD

Lucullus is the best early maturing variety while Fordhook Giant is the mid-season variety of choice.

TURNIPS

Early White Milan and Purple Top Milan are both recommended as being good producers of top quality roots.

RHUBARB

Canada Red produces a vigorous growth of deep red stalks which are medium sharp in flavour and of average quality.

Macdonald produces very vigorous growth of red stalks, medium sharp to acid in flavour and of excellent quality. This variety is quite winter hardy and is tolerant to crown rot.

(b) Greenhouse sown crops for transplanting to the garden

BROCCOLI

Da Cicco and Italian Early Green Sprouting are both recommended as good producers of medium size bluish green compact heads. Many lateral shoots can be harvested as well.

CABBAGE

The best early maturing varieties are Golden Acre and Viking. The later maturing varieties that produce best are Badger Market, with a small round head, Copenhagen Market with a medium size round head and Glory of Enkhuizen with a large head.

SAVOY CABBAGE

The variety Early Drumhead, a late maturing type that produces a flattened head of medium size, is recommended.

CAULIFLOWER

Codania and Early Snowball, two early maturing producers of medium size heads of good quality are best.

Atle is the recommended late maturing variety.

HEAD LETTUCE

Premier Great Lakes is the best early maturing variety and Imperial is the recommended mid-season type. Great Lakes is the medium to late maturing variety of choice.

Some success has been obtained by planting early maturing head lettuce varieties directly in the garden. However the production of head lettuce planted in this manner is inferior to that obtained from plants started in the green house.

- (c) Greenhouse sown crops for transplanting to cold frames

CELERY

Utah 15, a compact erect plant which produces flavourful green stalked celery is the recommended variety.

- (d) Greenhouse grown crops

CUCUMBERS

Surecrop Hybrid is an excellent producer of smooth, attractive, medium size fruit of good quality. Marketer

is a fair producer of smooth medium size fruit of very good quality. Both are recommended.

PEPPERS

Tendersweet is the best producer of large green juicy fruit of very good quality.

TOMATOES

Quebec #152 is the best producer of round, smooth, medium size, mild flavoured red fruit.

Early Chatham is recommended for the production of smooth, medium acid flavoured fruit.

Early Lethbridge is the recommended early maturing variety.

Growing Tender Garden Crops under Plastic

In a preliminary trial in 1958 a marked increase in yield of tender garden crops was obtained by growing them under plastic shelters in the garden. Corn, tomatoes, and beans were planted in late May in tent shaped plastic covered shelters on a garden area of 9' x 28' each. The average yield of a shelter was 62 ears of corn, 78 pounds of ripe and green tomatoes and 32 pounds of beans.

The plastic shelters gave the combined effects of warmer soil temperatures, warmer air temperatures, less soil moisture loss through evaporation and protection from late spring and early fall frosts. This resulted in the high yields given above.

The plants in the shelters did not show any signs of wilting or drought throughout the season yet they were never watered. On cool nights vapor condensed on the inside of the plastic and water droplets ran down to the ground. On hot sunny days careful attention had to be given to the ventilation of the shelters to keep the maximum air temperature from exceeding 100°F.

FLOWERS

Care must be taken to choose suitable hardy annuals for a successful flower garden. The annual flowers listed here have been selected on the basis of tests conducted at the Farm. For the most part these flowers were sown indoors in flats; later they were set out into cold frames to harden off and then transplanted into the gardens when the dangers of killing frosts were past.

African Daisy or Cape Marigold (*Dimorphotheca*) produces very showy daisy-like flowers suitable for bedding and border uses. The variety *Aurantiaca* in mixed color is very attractive.

Alyssum (*Lobularia*) is a dwarf plant that produces masses of little flowers. It is suitable for border planting. The varieties *Carpet of Snow* with white flowers and *Violet Queen* with violet flowers are recommended.

Annual Phlox (*Phlox Drummondii*) produces brilliantly coloured flowers suitable for bedding and border planting. Dwarf strains are recommended.

Asters (*Callistephus*) are suitable for cut flowers, bedding and border plants. The flowers are attractive, with a wide range of colours. Flower types vary from non-compact to round pompom type. The suggested varieties for border and bedding use is *Kirkwell Dwarf* and for bedding and cut flower uses are *California Giant*, *Giant Crego* and *Queen of the Market*.

Baby's Breath (*Gypsophila*) is very useful in mixing with other cut flowers. It can be sown directly outdoors in the early spring. The suggested varieties are *Covent Garden* with white blooms and *Carmine* with rose blooms.

Burning Bush (*Kochia*) can be used as an annual hedge or background for bedding. Because of the sudden fall frosts which occur in this area, the variety *Trichophylla* which retains its green color for a longer time, is recommended.

Butterfly-flower or Poor Man's Orchid (*Schizanthus*) is a small but brilliant and attractive flower suitable for bedding material. The variety *Wisetonensis* with mixed color is recommended.

California Poppy (*Eschscholtzia*) is suitable for bedding material. The single, mixed color strains and the double mixed color strains are recommended.

Candytuft (*Iberis*) is suitable for bedding and border uses. It can be sown directly outdoors in early spring. For bedding purposes the variety *Giant Hyacinth White* is recommended. The dwarf mixed colour strain is suggested for borders.

Clarkia (*Clarkia*) is suitable for bedding and cut flowers. It also can be sown directly out of doors in early spring. The variety *Royal Bouquet* and the double strain in mixed colour is recommended.

Cornflower (*Centaurea*) is suitable for bedding material; the double strain in mixed colour is recommended.

Cosmos or Mexican Aster (*Cosmos*) are suitable for cut flowers but are fairly susceptible to frost damage. The recommended strains are early single in mixed colour and double in mixed colour.

Toadflax (*Linaria*) is suitable for bedding material. It has snapdragon like flowers in various colours. The variety *Fairy Bouquet* is recommended.

Dwarf Morning Glory (*Convolvulus*) is suitable for border planting. The dwarf strain in mixed colours is recommended.

Lobelia (*Lobelia*) is suitable for border planting. *Crystal Palace* is the recommended variety.

Love-in-a-Mist (*Nigella*) has feathery foliage and attractive double flowers suitable for cutting. *Miss Jekyll* is the recommended variety.

Mignonette (Reseda). The spikes give off a fragrant odor. This plant can be sown directly outdoors in early spring for bedding purposes. Sweet Scented is the recommended variety.

Nemesia (Nemesia) is a dwarf plant having many small flowers in a wide range of colours. It is suitable for bedding. The recommended variety is Nana Compacta in mixed colour.

Painted Tongue (Salpiglossis) has medium size velvet textured flowers in a wide range of brilliant colours. Emperor is the suggested variety.

Petunia (Petunia) has single and double type wavy and curled edge flowers of varying sizes. It is excellent for bedding. Many hybrids are available but the suggested varieties are Fire Chief, Rose of Heaven and Red Satin.

Pot Marigold (Calendula) produces masses of medium size flowers which give a splend display when used for bedding. Orange King is the recommended variety.

Scarlet Flax (Linum) makes a very nice bedding plant when planted in masses. It can be sown directly outdoors in early spring. The variety Grandiflorum is recommended.

Snapdragon (Antirrhinum) produces attractive spike-like flowers in a wide range of colours that are suitable for cutting, bedding or border uses. Varieties from the Majestic series and the California Giant series are suggested for cut flowers and bedding purposes. Dwarf strains are recommended for border and bedding uses.

Strawflowers (Helichrysum) produce a wide range of brilliantly coloured flowers that are very nice bedding plants in the summer and can be dried for winter flower arrangements. Monstrosum is the recommended variety.

Sweet Pea (Lathyrus) produces fragrant blossoms in a wide range of brilliant colours. A variety of the Spencer series in mixed colour is suggested.

Perennial Flowers

The number of perennial flowers that are winter hardy in the Yukon is quite limited.

Delphinium (Ranunculoceae) is one of the hardiest perennials grown here. The recommended variety is Pacific Hybrid which produces tall, heavily flowered spikes of blue blooms.

Peonies (Paeonia) are quite hardy and produce many large densely formed blooms. The varieties, Festiva, Maxima, and Sarah Bernhardt are the recommended varieties.

Bleeding Heart (Dicentra) and Pinks (Dianthus spec-

cies) have shown promise but are considered to be only semi-hardy at this location.

Fall planted tulip bulbs gave a very nice flower display in the garden in June 1958.

Wild Iris have been brought in from their native habitat and successfully adapted to garden culture.

Ornamental Trees and Shrubs

Imported ornamental trees are not hardy here, mainly because of their difficulty in making sufficient plant growth in the year of planting. However very good use can be made of locally grown trees by transplanting and arranging them for landscaping purposes. These native species are white and black spruce, lodge pole pine, white birch, mountain ash and willow. Native shrubs which can also be used for this purpose are dwarf birch, wild roses, high bush cranberry and juniper.

Some imported shrubs are quite promising for ornamental plantings.

Altea, a small creamy colored Scotch rose is very hardy here, and hawthorn and dwarf spirea are also successfully grown.

Golden clematis is the only hardy climbing vine that survives at the Farm. It produces an abundance of yellow flowers and silver colored seed pods after flowering.

Small Fruits

Currants and gooseberries are not successful at this location because of their lack of winter hardiness.

Raspberry plants will survive the rigors of Yukon winters but severe infestations of mites have prevented the production of mature berries. No mite resistant varieties have been found yet at this location.

Saskatoon berry is the hardiest bush fruit tested at the Farm. Each year good production of large size fruit has been obtained. A special Beaverlodge selection is highly recommended.

Strawberry cross-breeding between wild and domestic strains and varieties has resulted in hybrid strains that appear to have superior winter hardiness. The two most promising hybrids have resulted from crossing Senator Dunlop X a wild strain and Pixie X a wild strain. The fruits of these hybrids are slightly smaller than the domestic parents. The first generation hybrid from Pixie produced fruit until freeze up.

Date Due

OCT 20 '76			
MAR 5 '79			
MAR 19 '79			

4725

JAN 29 '79
APR '86

*Richard the
Whitmore*

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